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An Interdisciplinary Analysis of MULTISPECTRAL SATELLITE Data for Selected Cover Types in the Colorado Mountains, Using Automatic Data Processing Techniques.

E74-10227) AN INTERDISCIPLINARY ANALYSIS OF MULTISPECTRAL SATELLITE DATA FOR SELECTED COVER TYPES IN THE COLORADO MOUNTAINS, USING AUTOMATIC DATA PROCESSING (Purdue Univ.) 6 p HC $3.00 CSCL 05B G3/13 N74-15032 Unclas 00227

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Monthly Progress Report

MONTHLY PROGRESS REPORT
For November 1973

A. Overall Status and Progress to Date

A.1 The vegetation cover type map for Vallecito Reservoir quadrangle was completed, and a mylar overlay finished. Currently a final draft copy of this vegetation cover type map is being produced for photographic reduction. The vegetation cover type map of Weminuche Pass quadrangle is in final draft stages.

A.2 Photo-Interpretation

A general photo-interpretation analysis was conducted on SKYLAB photography over the San Juan test site during the last two weeks in November. In order to contain the analysis within a workable unit, the analysis was restricted to the area (coverage) defined by S-190B frames 20 and 21. Three objectives were outlined for the analysis:

(A) Determine what cultural and/or natural features are distinguishable.

(B) Make a comparative analysis of the seven available photo sets.

(C) Assess gross metric qualities of the photography.

(A) Determine what cultural and/or natural features are distinguishable.

The quality and scale of the S-190B photography was such that a large quantity of features were identified. Fifteen of the most striking or anomalous features are presented here as a sample of the capabilities of the S-190B photography in resource inventory and land use planning. For each example the type of ground truth is noted.

(1) Moccasin Mesa Burn - An approximately 2000 acre area on the Southeast boundary of Mesa Verde National Park which was burned in 1972. The burn is distinguishable by its distinct color and the presence of fire lines. Ground truth - ground observation.

(2) Subdivision - This area near Durango is identifiable by the characteristic road network and location. Ground truth - ground observation.

(3) Clearcuts - Numerous clearcuts within the San Juan National Forest were noticed. The clearcuts range in size from less than one hundred acres to several hundred acres. They can be distinguished from the surrounding vegetation with some difficulty; however, a nominal amount of snow cover highly accentuates the vegetative differences as well as the access roads. Ground truth - aircraft photos.

(4) Cultural Boundaries - The boundary between the Ute Mountain and Southern Ute Indian Reservations is readily apparent due to differences in agricultural practices. The Ute Mountain Reservation is in pasture while the Southern Ute Reservation is under relatively intensive cropping. Ground truth - map data.

(5) Oil Field - The oil fields near Farmington, New Mexico can be identified by the intricate network of roads, pipelines, and drilling sites. The fields are extensive, containing hundreds of drilling sites, and cutting across the state line. The visible area totals approximately 1200 square miles. Ground truth - aircraft photos.

(6) Bare Soil - Freshly plowed fields within the Southern Ute Indian Reservation can be identified. The actual direction and stage of plowing can be seen in several fields. Through inference, several other freshly plowed fields were detected. Ground truth - none.

(7) Harvested Fields - Several fields that were in the process of being harvested were noticed. Due to the date and location, the crop was possibly alfalfa or similar type of hay.

(8) Lakes - Lakes and ponds as small as 5 acres were readily visible. Smaller impoundments could be detected with some degree of difficulty. Ground truth - map data.

(9) Sewage - Several sewage treatment areas were located by the rectangular shape of the settlement ponds. The uniform shape provides ease in identification. Ground truth - map data.

(10) Ski Area - The Purgatory Ski area was identified by the irregular pattern of the runs and by the access road. Ground truth - ground observation.

(11) Golf Course - The Durango Golf course has a typical pattern to the fairways and was easily identified. Ground truth - ground observation.

(12) Cliff Dwellings - The larger Indian ruins within the Mesa Verde National Park can be located. Ease of identification is partially subject to size and angle of view. Ground truth - ground observation.

(13) Western Edge of the San Juan Basin - A series of strike valleys and hogback ridges identify the western edge of the San Juan Basin. These are caused by tilted layers of shale and sandstone. Ground truth - ground observation.

(14) Glacial Valley - The fact that the Animas River valley has been glaciated is readily apparent due to the presence of glacial lakes and the canyon morphology. Ground truth - ground observation.

(15) Soil Types - Gross differences in soil characteristics can be noticed in many instances. Keys to identification are such factors as drainage patterns, agricultural practices, and topographic locations.

(B) Make a comparative analysis of the seven available photo sets.

The following photo sets were available:

(1)	70mm B & W .5μ to .6μ	Scale 1:247,000
(2)	70mm B & W .6μ to .7μ	
(3)	70mm B & W .7μ to .8μ	
(4)	70mm B & W .8μ to .9μ	
(5)	70mm Color IR	
(6)	70mm Conventional Color	
(7)	5-inch Conventional Color	Scale 1:945,000

In making a subjective comparison of the various photo sets, scale was the limiting factor. All of the features listed were most easily identified on the 5-inch color photography. For manual interpretation, among the 70mm photo types, the color was best, IR next, and the four B & W about equal, with the exception of water detection. The .8μ to .9μ band was best suited for hydrologic interpretation, among the B & W photos.

(C) Assess Gross Metric Qualities of the Photography

Because of the differences in focal length between the S-190A and S-190B sensors, there was a proportional difference in the absolute parallax of the resulting photography. The height/parallax conversion for the 5-inch format was 293'/.01mm, while it was 648'/.01mm for the 70mm format. The 5-inch format provided twice the accuracy in height measurement as the 70 mm format.

In measuring extreme height differences such as mountain ranges or canyons a skilled photo interpreter should be able to obtain height values ± 100 feet. Several height measurements were made in the analysis and this was found to be true.

A.3 Computer-Aided Analysis

During the first two weeks in November an initial non-supervised classification of the Mesa Verde National Park was performed with ERTS-MSS data (frame 317-17204, 5 June 1973).

It was felt that the first classification would be influenced by topographic factors. The canyon-ridge-Mesa patterns exhibited by the classified data showed that this was probably true. The Moccasin Mesa burn was the only vegetation type that was clearly spectrally seperable.

Further refinement of the 15 original classes should result in an acceptable vegetation classification at Level 1. Primary factors to be overcome in the analysis will be the effect of shadow within the highly dissected plateau and the absence of suitable ground truth.

B. Recommendations

Plans for transferring project personnel to other LARS projects for the period 1 Jan. 1974 to 1 May 1974 are being made. These plans are being made to preserve remaining salary funds so as to continue the project once the S-192 data is received. Initially we plan to discontinue the project four months and extend it four months beyond the current deadline, 31 May 1974.

C. Expected Accomplishments

Plans will be finalized for transferring project personnel to other LARS projects.

D. Significant Results

There are no author identified results in this report.

E. Summary Outlook

The project will be tenatively discontinued on 1 Jan. 1974 until 1 May 1974 and extended to 30 September 1974 to perform the tasks outlined in the contract.

F. Travel Summary

There were no contract travel funds used during this reporting period.